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a full Professorship of Graphics and Mathematics. Dr. Emch first came to the University in the spring of 1900. The following fall he was made an Assistant in Mathematics, and before the year closed he was elected Assistant Professor of Pure and Applied Mathematics. His recent promotion to a full Professorship brings Dr. Emch next to Professor DeLong in the Mathematical Department, and is a well-deserved recognition of his ability, faithfulness, and teaching power.

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BOOKS.

Plane Geometry by the Suggestive Method. By John A. Avery, Head of the Mathematics Department, English High School, Somerville, Mass. 8vo. Board, vi+122 pages. Boston: Benj. H. Sanborn & Co.

In this work, the demonstrations are not given in full, but are outlined by means of hints or suggestions. No figures are given but space is left under each theorem so that the pupil can fill in the figure for himself.

The book should prove valuable in the hands of teachers having time to give personal attention to the work of each pupil. F.

A Text-Book of Field Astronomy for Engineers. By George C. Comstock, Director of the Washburn Observatory, Professor of Astronomy in the University of Wisconsin. 8vo. Cloth, x+202 pages. Illustrated. Price $2.50. New York: John Wiley & Sons.

This work is designed chiefly for students in technical schools, where the work in Astronomy is usually a part of a course of technical and professional training of students who have no purpose to become astronomers. Such students are often ignorant of many important problems in Astronomy which are of great value to them in practical life. In this work are considered such problems which, in the opinion of the author, are most useful, among them being:

Rough Determinations of Latitude from altitude; Time and azimuth from single altitude; approximate Determinations circum-meridian altitudes for altitude; Time for single-altitude, etc. F.

The Constructive Development of Group Theoy. By B. S. Easton. Publications of the University of Pennsylvania, Mathematics, No. 2. iv+89 pages. Cloth. Price, 75 cents.

This monograph presents in continuous form, but omitting all proofs, the main concepts and results of abstract and substitution group theory. While the theory of linear groups is expressly excluded, some of its results are given under "systems of simple groups," pp. 83–84. An exhaustive bibliography occupies only 34 pages. The treatise proper occupies 39 pages, exclusive of the 8 pages of tables. A systematic use of abbreviations for titles and journals has enabled the author to give a vast number of references in so short a space. The monograph will appeal both to the beginner and to the specialist in group-theory. A technical review, noting some minor corrections, has been offered to the Bulletin of the American Mathematical Society. D.

A Mathematical Solution Book. Fourth Edition, revised and enlarged. By B. F. Finkel, Professor of Mathematics and Physics in Drury College. Cloth, xvi+549 pages. Price, $2.00. Springfield: Kibler & Co.

The need for such a text in English is evinced by its cordial reception, the book having passed through four editions in a comparatively short time. It aims to give "a solution of every problem presenting anything peculiar and of those problems which go the rounds of the conntry." While devoted chiefly to the essentials of arithmetic, algebra and geometry, it gives an abundance of interesting material not usually accessible to the teacher or student of elementary mathematics, and hence should prove a stimulus towards a wider knowledge of these subjects, It is aimed to supplement the usual texts. Occasionally a higher subject is drawn upon in the proofs; circulating decimals are treated by use of the algebraic theory of infinite geometrical progressions; the formulae in interest and annuities are obtained by algebraic methods; many of the formula in mensuration (after the 25 pages of elementary treatment) are established with the aid of Calculus. In the definitions of mathematical terms, the Greek and Latin derivations are given. The subject of higher plane curves receives considerable attention. As an exception to the usual care in the matter of definitions, that of a regular solid (p. 343) seems indaequate. The aggregate of two regular tetrahedrons, forming a dihedron, has its faces all equal, but is not a regular solid. Again, tetrahedron, octahedron, etc., are used by the author to denote regular solids only. As an introduction to geometry, a chapter on logic and logical fallacies is aptly inserted. The book surely merits the success it is receiving. D.

Niedere Zahlentheorie. Part I. By Dr. Paul Bachmann. B. G. Teubner, Liepzig. 1902. x + 402 pages.

This is the first of two volumes on elementary number theory written for Teubner's extensive collection of text-books on higher mathematics. It doesn't conflict seriously with Bachmann's ambitious series of volumes giving a comprehensive exposition of the theory of numbers, but rather forms a supplementary volume. An interesting feature is the exhaustive treatment of the known proofs by elementary number theory of the quadratic reciprocity law and the inter-relations of these proofs. While it is not as well adapted for a brief introduction to number theory as many of the current texts, it will appeal to the student wishing a complete account of the results and methods of the elementary parts of the theory of numbers. D.

Liniengeometrie mit Anwendungen. Volume I. By Dr. Konrad Zindler, Professor in the University of Innsbruck. Liepzig: G. T. Görshen, 1902. 8vo. viii + 380 pages. 87 figures.

This text-book, containing numerous exercises with hints for their solution, forms volume 34 of Schubert's collection of texts. It is a systematic exposition of Linegeometry, employing both synthetic and analytic methods. The present (first) volume treats chiefly of linear complexes and congruences of lines, together with applications to the theory of motion, mechanics, and graphic statics. The second volume will treat algebraic line configurations of higher than the first degree. D.